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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,936	04/03/2001	Jacques Schmitt	H37-091 DIV	9938

21706 7590 09/27/2004

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EXAMINER	
CROWELL, ANNA M	
ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 09/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/824,936	SCHMITT, JACQUES	
	Examiner	Art Unit	
	Michelle Crowell	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-12* is/are pending in the application.

4a) Of the above claim(s) *2, and 9-12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,4 and 6-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 29, 2004 has been entered.

Election/Restrictions

1. Applicant's election without traverse of Species I, Figure 2, claims 1-8 in Paper No. 5 is acknowledged. Additionally, claim 2 is withdrawn because it is directed to Species 6-Figure 10.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanada (Japanese Patent Publication 08-186094) in view of Shang et al. (U.S. 6,177,023) and Collins et al. (U.S. 5,210,466).

Referring to Drawings 1 and 2 and the abstract, Hanada discloses a capacitively coupled radio frequency plasma reactor 19 comprising: at least two electrically conductive electrodes 12 and 21 spaced from each other, each electrode having an external surface, an internal process space 11 enclosed between the electrodes, a gas providing means 16 for providing the internal process space with a reactive gas, at least one radio frequency generator 29 connected to at least one of the electrodes, at a connection location, for generating a plasma discharge in the process space, a means 26 to evacuate the reactive gas from the reactor, at least one substrate 1 defining one limit of the internal process space, to be exposed to the processing action of the plasma discharge, the at least one substrate extends along a general surface and is arranged between the electrodes, at least one dielectric layer 21a has at least one non planar-shaped external surface (Fig. 2 and abstract) extending outside the internal process space, the dielectric layer being a capacitor that is electrically in series with the substrate and the plasma, and the dielectric layer having a capacitance per unit surface values which are not uniform along at least one direction of the general surface, for generating a given distribution profile, especially for compensating a process non uniformity in the reactor.

Hanada fails to teach a radio frequency generator for frequencies greater than 13.56 MHz and at least one substrate with a largest dimension of at least 0.7m.

Referring to column 4, lines 26-47, Collins et al. discloses a capacitively coupled radio frequency plasma reactor using a radio frequency generator which applies frequencies greater than 13.56 MHz (50-800 MHz) since higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention for the radio frequency generator of Hanada

to apply frequencies greater than 13.56 MHz as taught by Collins et al. since higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages.

Referring to column 5, lines 58-63, Shang et al. teaches a plasma reactor for processing a substrate with a largest dimension up to 1m. It is well known in the art to scale up or down an apparatus to accommodate the desired substrate size. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Hanada with a substrate having a largest dimension up to 1m since it is well known in the art to scale up or down an apparatus to accommodate the desired substrate size. Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)).

With respect to claim 3, the dielectric layer 21a has a thickness "a" along a direction perpendicular to the general surface of the substrate 1, the thickness being non uniform along the dielectric layer, so that the reactor has a location-dependent capacitance per unit surface values along the general surface (Fig. 2 and abstract).

With respect to claim 4, the dielectric layer 21a is the thickest in front of the location in the process space 11 which is the furthest away from the connection location where the radio frequency generator 29 is connected to the at least one electrode and the thickness decreases from the process space location as the distance between the process space location and the connection location on the corresponding electrode decreases (Fig. 1 and abstract).

With respect to claim 6, at least one of the electrodes 21 has a non planar-shaped surface facing the substrate 1 (Figs. 1 and 2).

With respect to claim 7, the dielectric layer 21a is locally delimited by a surface of one of the electrodes 21, and the delimitation surface of the one electrode is curved (Fig. 1 and 2).

With respect to claim 8, the dielectric layer comprises a solid dielectric layer (Figs. 1, 2 and abstract).

4. Claims 1, 3, 4, and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanada (Japanese Patent Publication 08-186094) in view of Shang et al. (U.S. 6,177,023) and Sato et al. (6,199,505)

Referring to Drawings 1 and 2 and the abstract, Hanada discloses a capacitively coupled radio frequency plasma reactor 19 comprising: at least two electrically conductive electrodes 12 and 21 spaced from each other, each electrode having an external surface, an internal process space 11 enclosed between the electrodes, a gas providing means 16 for providing the internal process space with a reactive gas, at least one radio frequency generator 29 connected to at least one of the electrodes, at a connection location, for generating a plasma discharge in the process space, a means 26 to evacuate the reactive gas from the reactor, at least one substrate 1 defining one limit of the internal process space, to be exposed to the processing action of the plasma discharge, the at least one substrate extends along a general surface and is arranged between the electrodes, at least one dielectric layer 21a has at least one non planar-shaped external surface (Fig. 2 and abstract) extending outside the internal process space, the dielectric layer being a capacitor that is electrically in series with the substrate and the plasma, and the dielectric layer having a capacitance per unit surface values which are not uniform along at least one direction of

the general surface, for generating a given distribution profile, especially for compensating a process non uniformity in the reactor.

Hanada fails to teach a radio frequency generator for frequencies greater than 13.56 MHz and at least one substrate with a largest dimension of at least 0.7m.

Referring to column 2, lines 37-65, column 4, line 40-column 5, line 40, Sato et al. discloses a capacitively coupled radio frequency plasma reactor designed to use a radio frequency generator which applies frequencies greater than 13.56 MHz (30-300 MHz) (col. 2, lines 53-56) and that processes a substrate with a largest dimension of at least 0.7m (1 m) (col. 2, lines 37-44) since it is important to uniformly process large substrates at high frequencies with a reduced weight, dimension, and cost to the overall apparatus. Additionally, higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages and larger substrates yield increased product throughput. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to design the reactor of Hanada to apply frequencies greater than 13.56 MHz and accommodate at least one substrate with a largest dimension of at least 0.7m. as taught by Sato et al. since there is a growing demand in industry to uniformly process large substrates at high frequencies with a reduced weight, dimension, and cost to the overall apparatus. Additionally, higher frequencies provide commercially viable processing rates and substantial reduction in sheath voltages and larger substrates yield increased product throughput.

Moreover, referring to column 5, lines 58-63, Shang et al. teaches a plasma reactor for processing a substrate with a largest dimension up to 1m. It is well known in the art to scale up or down an apparatus to accommodate the desired substrate size. Additionally, it is well known

in the art to scale up/down the power in order to accommodate the desired substrate size (col. 6, lines 58-50). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Hanada with a substrate having a largest dimension up to 1m with appropriate power level since it is well known in the art to scale up or down an apparatus to accommodate the desired substrate size. Additionally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984),
cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)).

With respect to claim 3, the dielectric layer 21a has a thickness "a" along a direction perpendicular to the general surface of the substrate 1, the thickness being non uniform along the dielectric layer, so that the reactor has a location-dependent capacitance per unit surface values along the general surface (Fig. 2 and abstract).

With respect to claim 4, the dielectric layer 21a is the thickest in front of the location in the process space 11 which is the furthest away from the connection location where the radio frequency generator 29 is connected to the at least one electrode and the thickness decreases from the process space location as the distance between the process space location and the connection location on the corresponding electrode decreases (Fig. 1 and abstract).

With respect to claim 6, at least one of the electrodes 21 has a non planar-shaped surface facing the substrate 1 (Figs. 1 and 2).

With respect to claim 7, the dielectric layer 21a is locally delimited by a surface of one of the electrodes 21, and the delimitation surface of the one electrode is curved (Fig. 1 and 2).

With respect to claim 8, the dielectric layer comprises a solid dielectric layer (Figs. 1, 2 and abstract).

Response to Arguments

5. Applicant's arguments filed July 29, 2004 have been fully considered but they are not persuasive.

6. Regarding Hanada, applicant has argued that Hanada fails to use frequencies higher than 13.56 MHz as well as substrates with a largest dimension of at least 0.7m. It should be noted that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 8t00 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Collins et al. and Sato et al. give motivation to use higher frequencies. In addition, Shang clearly teaches it is well known to scale up/down an apparatus (i.e. chamber size, power level, substrate holder) in order to accommodate a larger or smaller sized substrate.

7. Regarding Collins, applicant has argued Collins fails to disclose a capacitively coupled RF plasma reactor and that the size of the substrate is for 4-8 inches in diameter. It should be noted that Collins is a capacitively couple RF plasma reactor since the plasma is generated between the cathode 32C and the anode 12, 13, 27. Additionally, two electrodes isolated from the wall could be used instead of using the chamber as the anode (col. 5, lines 1-18). Moreover, Sato et al. clearly states that apparatus of Collins is a capacitively couple RF plasma reactor (col. 1, lines 33-36). With respect to the substrate size, one cannot show nonobviousness by attacking

references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In addition, Shang clearly teaches it is well known to scale up/down an apparatus (i.e. chamber size, power level, substrate holder) in order to accommodate a large sized substrate.

8. Regarding Shang, applicant has argued that no disclosure of deposition gases or RF frequencies are given; however, it discloses forming thin films of silicon nitride or silicon oxide (Fig. 1, col. 4, lines 50-53), and furthermore the type of gases used in an apparatus is of no patentable significance. With respect to the RF frequencies, Shang discloses the power levels used (Fig. 1. col. 6, lines 55-67).

9. Also, applicant has argued that scaling up/down an apparatus to accommodate the desired substrate size is an oversimplification and ignores the real world reality of the technology; however, Shang clearly teaches it is well known to scale up/down an apparatus (i.e. chamber size, power level, substrate holder) in order to accommodate a large sized substrate (col. 5, lines 60-63, col. 6, 55-67). Additionally, in column 2, lines 31-34, Sato et al. teaches it is conventional known to scale up an apparatus in order to accommodate a larger substrate.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gegenwart et al. '152, Barnes et al. '737, and Kobayashi et al. '039 teach a plasma apparatus for processing large substrates having a dimension greater than 0.7m. Westendorp et

al. '036, Komino et al. '429, and Sakamoto et al. '062, Sakai et al. '096 teach capacitively coupled plasma reactors using frequencies higher than 13.56 MHz.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:00 - 5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AMC

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